SENATE FINANCE & CLAIMS
Exhibit No. 2
Date January 20, 2009
Bill No. SB 238

Mr. Chairman and Members of the Committee:

My name is Sylvia Moore, and I serve as Deputy Commissioner for Academic and Student Affairs in the Office of the Commissioner of Higher Education. The Montana University System (MUS) supports this bill.

Our MUS researchers have used Research and Commercialization funds to leverage their tech-transfer activities with great success – from products that help dispose of human wastes or remove toxic pollutants from smokestacks in coal-fired power plants, to value-added crop production such as malt barley for breweries and to new wheat strains that improve yield.

Success Stories from projects funded by R&C Board

Clean Waste of Belgrade, MT

Clean Waste (formerly Phillips Environmental) of Belgrade, produces an innovative compact dry toilet system. A core product of the company is the WAG (Waste Alleviation Gel) bag, which fits into the PETT portable toilet and traps wastes. Phillips incorporates *Earthpure*, an important technology developed with the help of MBRCT funding and in the laboratory of Dr. Gary Strobel of Montana State University, into this product line. *Earthpure* contains a composite of endophytic microbes, *M. albus* and *F. culmorum*, which decontaminate human/animal wastes and degrade organic matter, thus beginning the process of recycling. The fungus used by Phillips in the WAG bags is produced in mass at the Laverlam facility at Butte, Montana. Phillips has generated millions of dollars in revenues and hired an army of home assemblers in Belgrade for assembly of major components used in the PETT and WAG bag systems. The concept of making a safe reliable system to dispose of human wastes is attractive to the military, emergency organizations, school systems, police workers, various government agencies, the United Nations, and outdoor suppliers. Major clients of Clean Waste include DOD and FEMA.

***Choteau*, wheat variety, developed at MSU**

Dr. Luther Talbert and his research team at Montana State University developed and released a new solid-stemmed wheat named *Choteau*. The wheat has excellent yield potential and sawfly resistance. Montana farmers are growing at least 500,000 acres of *Choteau* per year for the past two years, with an average yield advantage of two bushels per acre over previously employed varieties. This amounts to a minimal value of $3 million per year to Montana farmers.

Attraction of Anheuser-Busch to Sidney

According to Dr. Jerald Bergman, Superintendent *at MSU's Eastern Agricultural Research Center (EARC)*, MBRCT grant activity had a very positive influence on Anheuser-Busch officials' decision to locate a $6.8 million malt barley handling and storage facility in Sidney, Montana. Grant projects helped demonstrate the potential for expanded irrigation development and the use of malt barley as a value-added rotational crop with sugar beets, potatoes, and other high-value crops. Bergman states, "These projects are a perfect example of promoting and developing new and expanding agricultural industries and the creation of new wealth through agriculture as part of a regional team effort. Research is definitely an investment in the growth of agriculture and high-value / value-added products and their commercialization. It is very rewarding to have the grant resources to conduct this pertinent research to support irrigation development and the commercialization of high-value and value-added crops including the malt barley industry." The research at EARC is conducted under the leadership of Bergman and Dr. Joyce Eckhoff.

Improving Productivity and Value of Wheat for Montana

This project resulted in release and deployment of new winter wheat cultivars adapted to Montana. Under Dr. Mike Giroux's leadership at *Montana State University*, Bozeman, four single-gene, imidazolinone-resistant winter wheat cultivars were developed. *MT1159CL*, the first herbicide resistant cultivar released in 2004, was replaced by the improved cultivars, *Norris, Hyalite*, and *Bynum*, which were released in 2005. Westbred LLC (located near Bozeman) has licensed the technology for marketing and production in Montana. Over 60,000 acres of production of one-gene winter wheat varieties were planted in Montana in 2008.

ZDye licensed technology from MSU

Zdye,LLC has been established to license technologies from *Montana State University* that were partially created with R and C funding. ZDye will develop and market products for proteomics and diagnostic applications. Zdye is currently developing a family of unique, multicolor fluorescent dyes (Zdyes) with properties optimized for protein detection in proteomics. Zdye will be in a strong position to create an internationally competitive company targeting proteomics and diagnostic technology.

Immobilized Metal Polyamine Composites (IMPACS) for Removal and Recovery of Negatively Charged Species from Contaminated Waters and Mine Leaches

Dr. Edward Rosenberg, at the *University of Montana*, in collaboration with Purity Systems (PSI), Missoula, has advanced this project to the development of the commercial Immobilized Metal Polyamine Composite (IMPAC), ZrBPAP. *Ammtec Ltd.*, an internationally recognized metallurgical testing firm specializing in mining, metals processing, and environmental remediation on mine sites, has become a minority owner in PSI. Ammtec is now marketing and testing this composite for arsenic and selenium remediation and remediation of the carcinogenic chromate ion. The technology is directed at positively charged ions and represents a new direction for supramolecular silica polyamine composite materials. Initial commercialization of earlier work funded by MBRCT has occurred at the Redbank Mines copper recovery project in Australia using PSI's copper selective composite, CuWRAM. *Redbank Mines, Ltd*. has engaged Ammtec to coordinate and implement the process, which is based on proprietary technology under license from PSI.

Advanced Materials for Metal Processing, Recovery and Remediation

The project is a collaboration between Purity Systems Inc. (PSI) in Missoula and the *Department of Chemistry at the University of Montana* under the direction of Professor Edward Rosenberg. The research is directed at the development of new granular materials that allow more environmentally benign methods for metal processing and recovery, including acid mine drainage clean up. The effort has resulted in the development of two new resins, one for the selective removal of ferric ion from transition metal mixtures and from lanthanides, and one for the selective removal of gallium from aluminum, zinc and iron. Resin sales have been made for pilot demonstrations and PSI anticipates additional orders.

Autonomous Carbon Dioxide Sensor (SAMI)

Dr. Michael DeGrandpre, *University of Montana*, and David Irwin, *Sunburst Sensors*, Missoula, used grant funds to make modifications to the SAMI (Submersible Autonomous Moore Instrument for CO2). These modifications resulted in a user-friendly instrument for quantifying sources and sinks of atmospheric carbon dioxide. Sunburst Sensors sells the instruments to oceanographic and freshwater researchers in Germany, Spain, Australia, Norway and the United States. Potential commercial applications include global climate change, biomedical and industrial markets.

Development and Testing of a Metallic Filter to Remove Mercury from Gas Streams

PI Dr. Kumar Ganesan
Department Head, Environmental Engineering
Montana Tech of The University of Montana

This program sought to develop a new generation filters to remove toxic pollutants from the smokestacks of coal fired power plants in anticipation of EPA lower of mercury emission standards for coal fired power plants. The research program was successful and these devices have been effectively tested at Coal Strip power plants in collaboration with PPL and a patent has been issued on the device. Additional support has been obtained from the Department of Energy in the amount of $213,000 and second generation devices have been developed with improved efficiency and lower production costs.

Design of Ultra High Pressure Water-Jet Cutting Pump

PI Dr. Richard P. Donovan
Department of General Engineering
Montana Tech of The Unversity of Montana

This program was in collaboration with Apex Technologies to develop innovative design approaches to high pressure water-jet cutting devices. The new concepts would significantly reduce power consumption and improve lifetime and serviceability. Several prototypes have been fabricated at the Montana Tech RAVE facility and now undergoing extensive field testing by Apex.

Montana Tech will conduct performance modeling of the devices and suggest performance enhancements to the current designs.